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REDISCOVERY OF THE SNAKE *CHERSODROMUS RUBRIVENTRIS*
(SQUAMATA: COLUBRIDAE) IN CLOUD FOREST OF THE
SIERRA MADRE ORIENTAL, MÉXICO

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Uriel Hernández-Salinas¹, and Luis Badillo-Saldaña¹

ABSTRACT.—As presently recognized, the snake genus *Chersodromus* (Colubridae) is composed of 2 species, *C. liebmanni* and *C. rubriventris*, both of which are endemic to eastern Mexico. Distribution of the genus is largely restricted to the states of Veracruz and Oaxaca and broadly corresponds to the south of the Sierra Madre Oriental and the eastern portion of the Transvolcanic Belt. *Chersodromus liebmanni* is the more common species of the genus and is distributed in the foothills of several localities in central Veracruz and northern Oaxaca. However, *C. rubriventris* is restricted to only a few small localities in San Luis Potosí and now the state of Hidalgo. Both species appear to be restricted to montane forest communities, including pine-oak, cloud forest, and tropical forest habitats.

RESUMEN.—Tal como se ha observado, el género *Chersodromus* (Colubridae) se compone de dos especies, *C. liebmanni* y *C. rubriventris*, las cuales son endémicas al este de México. La distribución del género se restringe a los estados de Veracruz y Oaxaca, que en términos generales corresponden al sur de la Sierra Madre Oriental, y la porción este del Eje Volcánico Transmexicano. *Chersodromus liebmanni* es la especie más común del género, y se distribuye en las pendientes de varias localidades del centro de Veracruz y norte de Oaxaca. Sin embargo, *C. rubriventris* está restringida a pequeñas localidades en San Luis Potosí y ahora en el estado de Hidalgo. Ambas especies parecen estar restringidas a comunidades de bosques de montaña, incluyendo bosque de pino-encino, bosque de niebla, y hábitats de selva tropical.

Chersodromus rubriventris was described as a new genus (*Schmidtophis*) by Taylor (1949), based on one individual (LSU 577) collected by Charles Shaw in the Xilitla Region of San Luis Potosí State. Later, Dixon and Ketchersid (1969) reported a second specimen of this species from El Madroño, state of Querétaro (TCWC 28919). This specimen varied only slightly in scale counts and color pattern from the holotype, and a comparison with material from *C. liebmanni* revealed similarities in several other diagnostic characteristics, such as the presence of relatively long and slender maxillary teeth (Table 1). Based on the presence of these shared features, Dixon and Ketchersid (1969) considered *Schmidtophis* to be a junior synonym of *Chersodromus*, and they reassigned *rubriventris* to the latter genus. One additional female specimen of *C. rubriventris* (TCWC 57131) was subsequently found and examined by McCoid et al. (1980). It was from the same locality as the specimen of Dixon and Ketchersid (1969). Prior to this study, the known material of *C. rubriventris* comprises only 3 specimens collected across a

60-year period. This rare species has a very restricted distribution in the cloud forest of eastern Mexico (Smith and Taylor 1945).

The cloud forest in Mexico is found from 600 m to 2700 m elevation, with *Quercus sartorii* and *Liquidambar macrophylla* as dominant vegetation types (Rzedowski 1978). The topography of this environment is conducive to heterogeneous microhabitats (Ponce-Reyes et al. 2012). Cloud forest habitat has the highest species richness of plants and animals; in addition, it has the highest number of vertebrate species endemic to Mexico (Challenger 1998). In the case of herps, cloud forest represents the highest species richness of the country (Wilson and Johnson 2010), holding particular species and/or genera from mountain areas (e.g., *Anolis naufragus*, *Geophis mutitorques*, *Chiropterotriton orculus*; Flores-Villela et al. 2010). This vegetation type has also provided several new records of amphibian and reptile species (Cruz-Elizalde et al. 2011).

This study reports the first record of *Chersodromus rubriventris* from a cloud forest in the state of Hidalgo, Mexico. In addition, we

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TABLE 1. Characteristics of specimens of *Chersodromus rubriventris* collected in this study (CIB-4285–4287), the holotype (Taylor 1949), and specimens of *C. liebmanni*. BL = body length, SVL = snout–vent length, TL = tail length.

Species characteristics	<i>C. rubriventris</i>			<i>C. liebmanni</i>		
	CIB-4285	CIB-4286	CIB-4287	*Taylor (1949)	**EHT–HMS 4564 (Taylor 1938)	Reinhardt (1860)
Age/sex class	Young male	Juvenile female	Adult female	Unknown	Unknown	Unknown
Prefrontal scale	Yes	Yes	Yes	Yes	Yes	Yes
Postocular scale	1	1	1	1	1	1
Supralabial scales	6	6	5	6	7–7	7–7
Infralabial scales	7	7	6	7	8–8	8–8
Conformation of scales in body	15–15–15	15–15–15	15–15–15	15–15–15	18–17–17	17–17–17
Ventral scales	123	128	126	125	135	131
Anal scale	Single	Single	Single	Single	Single	Single
Subcaudal scales	45	38	39	41 + 1	34	42
BL (mm)	130	182	349	308	199	250
SVL (mm)	100	150	278	240	166	131
TL (mm)	30	32	71	68	33	119

*Original description.

**Edward H. Taylor–EHT and Holbert M. Smith–HMS personal collection.

add information on morphological features (scutellation, color pattern) and natural history previously not reported for this species (Taylor 1949, Dixon and Ketchersid 1969, McCoid et al. 1980).

From January to May 2012, we conducted surveys for reptiles and amphibians in the Chilijapa Municipality of Tepehuacán de Guerrero, Hidalgo, México (21°00'18" N, 098°52'12" W, datum WGS84; elevation 1371 m; Fig. 1). This region is approximately 40 km south of Xilitla, San Luis Potosí, and 42 km southeast of El Madroño, Querétaro, where specimens of *C. rubriventris* were previously collected (Taylor 1949, Dixon and Ketchersid 1969, McCoid et al. 1980). The primary vegetation type in Chilijapa Municipality is cloud forest dominated by *Quercus sartorii*, *Liquidambar macrophylla*, and *Pinus patula* in arboreal strata, where these species are from 8 to 15 m tall (Fig. 2A; Rzedowski 1978). Most of the original vegetation has been removed to convert the land to agricultural use; the extant original vegetation stands are greatly fragmented (Fig. 2B). Mean annual temperature is 24 °C; annual rainfall averages 2120 mm, concentrated during the wet season from June to September (INEGI 2011).

The specimens were searched and collected by the direct search method by removal of rocks, logs, fallen logs, and litter (Casas-Andreu et al. 1991). The collected specimens were fixed in 10% formalin, preserved in 70% ethanol, and deposited in the herpetological collections of the Centro de Investigaciones Biológicas (CIB) of the Universidad Autónoma del Estado de Hidalgo in Pachuca, Hidalgo, México.

Body measurements were recorded with a digital caliper (to the nearest 0.1 mm). Morphological terminology and scale count methods followed Taylor (1949). Sex was determined by direct observation of the gonads. Color pattern was assessed from both examination of live specimens and inspection of photographs.

Morphology

A young male (CIB-4285; Fig. 3A) was collected on 17 February 2012. Two more specimens were found on 18 May 2012: one juvenile female (CIB-4286) and one adult female (CIB-4287). All 3 specimens were found in the same locality. The juvenile male (CIB-4285) is smaller in snout–vent length (SVL), tail length

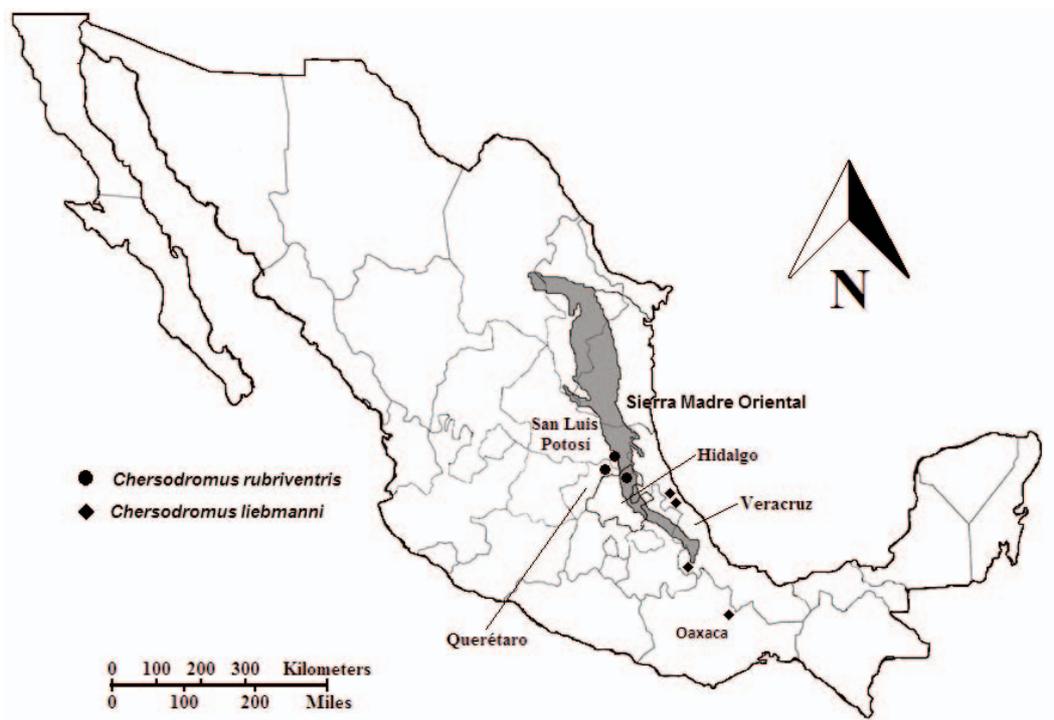


Fig. 1. Geographic distribution of *Chersodromus rubriventris* in the Sierra Madre Oriental and the state of Hidalgo. Previous records from San Luis Potosí and Querétaro are shown.

(TL), and body length (BL) than the juvenile female (Table 1). The adult female (CIB-4287) is larger in all measures than the juveniles (Table 1). All specimens are in good condition, and all have dorsal scales in the arrangement of 15-15-15, all keeled, preoculars 1-1. Differences were found in supralabial and infralabial scales among juvenile specimens (CIB-4285-4286) and the adult specimen (CIB-4287). The number of ventral scales was higher in the female specimens (128 scales) and lower in the juvenile male specimen (123 scales); the 3 specimens showed differences in subcaudal scales (Table 1). In all specimens, there was one fused prefrontal, one small frontal, one loreal, one parietal, one supraocular, and one temporal scale; there was no preocular scale. The fifth supralabial was in contact with the parietal scale; the third and fourth supralabials were in contact with the orbit; and the first 2 lower labials were in contact with the anterior chin shield. The first pair of chin shields was larger than the second pair, and the anal scale was single.

Coloration

The dorsal color pattern in live individuals is slate-black, with a yellow band around the neck. In all individuals, the band has irregular borders on the parietals passing down on the throat, covering about 4 ventral scales and the 2 pairs (anterior and posterior) of chin shields in one specimen (CIB-4285), 3 ventral scales and the 2 pairs of the chin shields in another (CIB-4286), and 5 ventral scales and the posterior region of the second pair of chin shields in a third (CIB-4287). The head and supralabials are black, with a light area on the mental scale in only one individual (CIB-4285). A light area covers the first 3 lower labials. Ventral and subcaudal scales vary among individuals, being bright red (CIB-4285), brick red (CIB-4286), or pink (CIB-4287). Red color was observed in the ventral region (Fig. 3B); however, Taylor's specimen was uniformly pink (Taylor 1949), but the rest of the color patterns were similar to the previously described specimens (Taylor 1949, McCoid et al. 1980).



Fig. 2. Vegetation types of localities of *Chersodromus rubriventris* in cloud forest (A) and fragmented forest (B), of Chilijapa, Hidalgo State. Photographs by Christian Berriozabal Islas and Luis Badillo Saldaña.

Natural History

Chersodromus rubriventris inhabits cloud forest with rocky slopes, and all individuals in this study were collected in fragmented areas of cloud forest. One specimen was found (crawling) at night at 22:01, whereas the others were found under rocks during the day at 17:00. Inspection of stomach contents indicated that the diet includes insect larvae, mainly of the order Coleoptera, and adults of the family Formicidae (Hymenoptera).

Since 2003, we have been conducting research focused on herpetofaunal species in the state of Hidalgo. At the present time, we estimate that at least 174 species occur within Hidalgo, including 54 amphibian species and

120 reptile species (Ramírez-Bautista et al. 2010, Berriozabal-Islas et al. 2012). The diversity of snakes is especially striking: at least 79 species occur within the state, representing 66% of the reptile diversity alone and 45% of the total herpetofaunal diversity. New discoveries by our group and others (Roth-Monzón et al. 2011) indicate that our measurement of species richness plotted against collection effort has not yet reached an asymptote.

The genus *Chersodromus* is composed of 2 species, *C. liebmanni* and *C. rubriventris* (Dixon and Ketchersid 1969). *Chersodromus rubriventris* was described by Taylor (1949) as the first species of the genus *Schmidtophis*, but the species was later transferred to



Fig. 3. Specimens of *Chersodromus rubriventris* (CIB-4285) showing coloration of the dorsal surface (A) and the ventral region (B). Photographs by Christian Berriozabal Islas and Luis Badillo Saldaña.

Chersodromus by Dixon and Ketchersid (1969). Our observations of *C. rubriventris* represent the first records of this species from Hidalgo, according to the most recent list of the herpetofauna of the state (Ramírez-Bautista et al. 2010). With these new records, the distribution expands from the previously known localities: Xilitla, San Luis Potosi (Taylor 1949), and El Madroño, Querétaro (Dixon and Ketchersid 1969, McCoid et al. 1980). In each of these previous reports, however, only a single specimen was used to provide a general description; thus, morphological variation and natural history remain poorly known. We also compare morphological characteristics between previously described specimens of *C. rubriventris*

and the specimens from Hidalgo, as well as *C. liebmanni* (Table 1).

The 3 new specimens of *C. rubriventris* all share with the previously described specimens the presence of 15-15-15 dorsal scale rows, a dark black dorsum, a bright red venter, and a yellow parietal band, all taxonomically important characteristics in snakes (Taylor 1949). The morphological characteristics that provide these new records confirm those found in previously described specimens of *C. rubriventris*. However, our record is based on 3 morphologically well-characterized individuals (Table 1), with marked differences among themselves and from Taylor's specimen (1949). For example, our specimens (CIB-4286, 4287)

had a higher number of ventral scales and lower number of subcaudal scales than Taylor's specimen. Most morphological characteristics of our young specimen (CIB-4285) were similar to Taylor's, so we suggest that the specimen is male (Table 1). By comparison, all specimens of *C. rubriventris* have a lower number of supralabials, infralabials, scale rows, and ventrals than specimens of *C. liebmanni* (Table 1).

The 2 species of the genus *Chersodromus* (*C. liebmanni* and *C. rubriventris*) inhabit cloud forest of Mexico. Although *C. liebmanni* is considered relatively common (www.iucn.org), the combination of a secretive lifestyle and apparent rarity make it complicated to observe in its natural environment, as occurs with *C. rubriventris*, which has been infrequently recorded. Therefore, the new records from the cloud forest of north Hidalgo offer a new understanding of the ecology and distribution of this species. Our observations extend our knowledge of the natural history of this species in some important ways. We confirm that *C. rubriventris* may be found under rocks or logs during the day and that the species exhibits at least some surface activity during night. The diet of *C. rubriventris* includes both larvae and adults of small insects, and such a diet suggests that these snakes may regularly emerge from subterranean refuges to hunt prey found under surface rocks and logs. This behavior could help explain why snakes remain under cover during the day. Assessing the abundance of fossorial snakes is challenging, given the difficulties of making underground observations and the rarity of observing such snakes on the the surface. Given the paucity of specimens of *C. rubriventris* collected prior to our study, however, this species might indeed be numerically rare (Taylor 1949, Dixon and Ketchersid 1969, McCoid et al. 1980). In addition, the cloud forest habitat of this species has been heavily fragmented by conversion of the land to pastures and crops. Indeed, much of the present landscape harbors only small patches of the original forest. Given the small geographical area known to be occupied by this snake, there is good reason to conclude that the global population of *C. rubriventris* is small.

Chersodromus rubriventris is an endemic species of Mexico and possesses a distribution range restricted to a locally declining vegetation community of cloud forest (Ponce-Reyes

et al. 2012). Both species of the genus are listed with federal and international conservation agencies (IUCN 2013 and NOM-059-SEMARNAT-ECOL-2010) as species of special protection (SEMARNAT 2010). *Chersodromus rubriventris* is presently categorized by the IUCN as endangered (IUCN 2013), given that there were, until our new record, only 3 known specimens: one in San Luis Potosi and 2 in Querétaro. We support the implementation of conservation measures in the region occupied by this rare species, which appears to be vulnerable to local and global extinction from habitat alteration.

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LITERATURE CITED

- BERRIOZABAL-ISLAS, C., A. RAMÍREZ-BAUTISTA, L.M. BADILLO-SALDAÑA, AND R. CRUZ-ELIZALDE. 2012. New records of the snake *Leptophis diplotropis* (Günther, 1872) (Squamata: Colubridae) from Hidalgo State, México. Check List 8:1370–1372.
- CASAS-ANDREU, G., G. VALENZUELA-LÓPEZ, AND A. RAMÍREZ-BAUTISTA. 1991. Cómo hacer una colección de anfibios y reptiles. Cuadernos del Instituto de Biología 10, Universidad Nacional Autónoma de México, D.F.
- CHALLENGER, A. 1998. Utilización y conservación de los ecosistemas terrestres de México. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO) y Universidad Nacional Autónoma de México.
- CRUZ-ELIZALDE, R., U. HERNÁNDEZ-SALINAS, A. RAMÍREZ-BAUTISTA, AND O. BARRERA-HERNÁNDEZ. 2011. *Bolitoglossa platydactyla*, maximum elevation. Herpetological Review 42:258.
- DIXON, J.R., AND C.A. KETCHERSID. 1969. The status of the Mexican snake genus *Schmidtophis* Taylor (Colubridae). Journal of Herpetology 3:163–165.
- FLORES-VILLELA, O., L. CANSECO-MÁRQUEZ, AND L.M. OCHOA-OCHOA. 2010. Geographic distribution and conservation of the Mexican central highlands herpetofauna. Pages 303–321 in L.D. Wilson, J.H. Townsend, and J.D. Johnson, editors, Conservation of the Mesoamerican amphibians and reptiles. Eagle Mountain Publishing. L.C., Eagle Mountain, UT.
- INEGI. 2011. Instituto Nacional de Estadística, Geografía e Informática. México. [Cited 24 July 2012]. Available from: <http://www.inegi.org.mx/inegi/default.aspx>

- [IUCN] International Union for Conservation of Nature and Natural Resources. 2013. The IUCN Red List of Threatened Species: categories and criteria [online]. [Cited April 2013]. Available from: <http://www.iucnredlist.org>
- MCCOY, M.J., J.H. SITES JR, AND J.R. DIXON. 1980. An additional specimen of *Chersodromus rubriventris* (Colubridae). *Southwestern Naturalist* 25:429.
- PONCE-REYES, R., V.H. REYNOSO-ROSALES, J.E.M. WATSON, J. VANDERWAL, R.A. FULLER, R.L. PRESSEY, AND H.P. POSSINGHAM. 2012. Vulnerability of cloud forest reserves in México to climate change. *Nature* 1453:1–5.
- RAMÍREZ-BAUTISTA, A., U. HERNÁNDEZ-SALINAS, F. MENDOZA-QUIJANO, R. CRUZ-ELIZALDE, V.D. VITE-SILVA, B.P. STEPHENSON, AND A. LEYTE-MANRIQUE. 2010. Lista anotada de los anfibios y reptiles del estado de Hidalgo, México. Universidad Autónoma del Estado de Hidalgo, Comisión Nacional para el Conocimiento y Uso de la Biodiversidad.
- REINHARDT, J. 1860. Herpetologiske Meddelelser. Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjöbenhavn 22:243–245.
- ROTH-MONZÓN, A.J., A.A. MENDOZA-HERNÁNDEZ, AND O.A. FLORES-VILLELA. 2011. *Lampropeltis ruthveni* (Serpentes: Colubridae) from the state of Hidalgo, México. *Southwestern Naturalist* 56:430–431.
- RZEDOWSKI, J. 1978. Vegetación de México. Editorial Limusa.
- [SEMARNAT] SECRETARIA DE MEDIO AMBIENTE Y RECURSOS NATURALES. 2010. Norma Oficial Mexicana NOM-059-SEMARNAT-ECOL-2010. Protección ambiental-especies nativas de México de flora y fauna silvestre, Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio-lista de especies en riesgo. *Diario Oficial de la Federación* (Segunda sección: 6 de marzo):1–78.
- SMITH, H.M., AND E.H. TAYLOR. 1945. An annotated checklist and key to the snakes of Mexico. *Bulletin of the United States National Museum* 187:1–239.
- TAYLOR, E.H. 1949. A preliminary account of the herpetology of the state of San Luis Potosí, México. *University of Kansas Science Bulletin* 33:169–215.
- TAYLOR, E.H., AND H.M. SMITH. 1938. Miscellaneous notes on Mexican snakes. *University of Kansas Science Bulletin* 25(13):239–258.
- WILSON, L.D., AND J.D. JOHNSON. 2010. Distributional patterns of the herpetofauna of Mesoamerica, a biodiversity hotspot. Pages 30–235 in L.D. Wilson, J.H. Townsend, and J.D. Johnson, editors, *Conservation of the Mesoamerican amphibians and reptiles*. Eagle Mountain Publishing. L.C., Eagle Mountain, UT.

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